

# DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION 21 • FIRE SUPPRESSION

## 21 00 00 • FIRE SUPPRESSION

### SECTION INCLUDES

Wet Pipe Sprinkler Systems  
Dry Pipe Sprinkler System  
Residential Sprinkler Systems  
Standpipe Systems  
Fire Pumps  
Underground water mains.

### RELATED SECTIONS

09 25 00 Gypsum Drywall  
09 99 00 Painting  
22 00 00 Plumbing  
26 00 00 Electrical  
28 00 00 Electronic Safety and Security

### TECHNICAL STANDARDS

#### DESIGN

The intent should be to minimize cost by: minimizing pipe sizes, concealing as much of the piping as possible, and incorporating all the exceptions allowed in current codes and NFPA or other applicable standards.

For example NFPA 13R; does not require sprinklers for:  
small closets (< 24SF),  
small bathrooms (<55 SF), or  
attics and crawl spaces

Do not install wet system piping in unheated areas even with insulation tented as shown in NFPA standards. It is impossible to control or obtain satisfactory installation of insulation in attic spaces to prevent freezeups. Install wet system piping only in warm or heated areas.

Avoid dry pipe systems unless required to provide sprinkler protection in unheated attic space having a wood roof.

Dry system piping should be arranged to provide complete drainage of all piping. Provide proper pitch in all piping and low point drains should be located in locations accessible to maintenance personnel such as janitors closets, boiler rooms, etc. and not in resident's closets, above ceilings, etc. Designers must check the elevations of all dry piping after construction

Review the proposed design with the local Fire Department and Authority Having Jurisdiction. Do not commit verbally or in writing to local FD or AHJ any features requested or discussed that are not required by code or standards before obtaining prior approval from DHCD/LHA.

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For mid or high rise buildings with an existing fire pump, a full fire pump test is required. If a new fire pump is required to supply automatic sprinkler protection, then design in accordance with most recent and applicable NFPA standard # 20.

Provide bypass piping for pump installations.

The sprinkler system should not be hydraulically designed to the maximum output of the fire pump, e.g. lower floors may be adequately supplied from available public water supply and still have optimum pipe sizing. This will assure some level of protection if fire pump is out of service.

The preferred driver for fire pumps is electric motor (less maintenance), however, this requires adequate electrical capacity and possible connection to an existing emergency generator. If a new fire pump is required, the fire pump controller should be compatible with the emergency generator.

If there is no emergency generator, review other pump drivers such as diesel engine, natural gas engine, etc. Provide cost comparisons. The building may need an emergency generator or a replacement of an existing emergency generator.

Similarly code-required standpipe systems (either existing or new) should be designed in accordance with most current NFPA standard # 14.

The majority of systems should be hydraulically designed to the available water supply in accordance with NFPA residential sprinkler standards 13R or 13D as applicable. Provide a hydrant flow test information for design. If available test data is used it should not be more than two years old. If current flow test data is not available, conduct a flow test prior to designing.

NFPA 13R & 13D permit the use of combined domestic water and fire suppression systems. This is the design approach that we should be taking. This approach has a potential drawback in that it requires flows of domestic load and fire loads be combined in hydraulic calculations which may result in the available water supply being inadequate when using the preferred smaller size pipes. However, this may be overcome by the use of the NFPA permitted residential domestic shutoff valve for dual purpose systems, e.g. Tyco Model RSV-1.

There is a potential for water hammer with high pressure water systems. Evaluate and provide for correction of hydraulic shock if anticipated.

If the available public water supply is not adequate to support the installation of automatic sprinkler protection, a new and suitable water main installation will be required. This new main should be designed in accordance with NFPA standard 24 for underground water mains. Coordinate with the local water department and obtain their written requirements before beginning the water main design.

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If the existing water supply cannot support the addition of a sprinkler system, please provide an evaluation why it cannot.

Optimize piping arrangement to minimize exposed piping. Generally the use of sidewall sprinklers will facilitate the concealing of piping.

Provide backflow protection in accordance with plumbing code.

Commercial pipe and valve identification standards are not required on residential system except where expressly called for by NFPA 13R & 13D. The snap-on pipe markings will be subject to vandalism. Painted markings in unfinished areas should suffice. CPVC piping if exposed in finished areas and not covered with soffit, etc. should be painted to match wall. Use CPVC pipe manufacturer recommended paints (DO NOT USE oil based paint).

Locate spare sprinkler cabinets where they will not be subject to vandalism.

NFPA 13 (3-3.5) allows CPVC piping in light hazard (residential) areas such as small rooms or closets. Although not required, adding a sprinkler head in these areas or enclosing the piping in properly enclosed soffit will be acceptable.

Avoid the installation of tamper switches on valves; and use the locking exception permitted by NFPA 13R. Adding tamper switches complicates and adds costs to systems that require a Fire Alarm Control Panel.

### **In elderly resident locations:**

Typically, fire alarm control panels are existing and sprinkler waterflow alarms can be interfaced with the building fire alarm system without costly changes.

### **In family developments:**

Local sprinkler waterflow alarms should be compliant with current code and standards based on the number of dwelling units unless local written ordinances supersede the codes.

Determine if there is a written local ordinance requiring a Fire Department connection for sprinkler water flow. If there is no special ordinance, design to applicable codes and standards. If there is a written local ordinance, provide a copy for the record.

Provide individual water flow alarm notification (horn/strobes) for each unit and a building alarm. This may require a Fire Alarm Control Panel be installed in every building.

Always coordinate with the local fire department and determine if a fire watch will be required during construction. When required, coordinate with the Local Housing Authority to prepare Contract Documents that will meet this requirement in the most cost effective fashion.

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### MATERIALS

All products specified shall have UL and FM approval, if applicable.

Do not install CPVC piping in areas subject to cooking oils accumulation such as over stoves. Specify metal piping in these locations, even if piping is to be covered

Access panels should be provided, if required.

Escutcheons should be specified for all piping penetrations in finished areas.

In retrofit applications where piping cannot be concealed behind existing construction, install it in prefabricated metal or plastic soffits. Products such as Deco Shield or prepainted metal soffit material are acceptable in unoccupied areas piping should remain exposed.

### RECORD DRAWINGS

Since fire protection sprinkler shop drawings are typically very representative of the ultimate final installation of the sprinklers, revise the record drawings requirements in Division 1 of the specifications to have the contractor prepare the As Built Record Drawings and provide blue line and an additional electronic copy of these documents for the Local Housing Authorities files.